MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Mail Stop 2321
Gaithersburg, Maryland 20899

SRM Number: 2648a
MSDS Number: 2648a
SRM Name: Propane in Nitrogen
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Propane in Nitrogen

Description: This SRM mixture is supplied in a DOT 3AL specification aluminum (6061 alloy) cylinder with a water volume of 6 L. Mixtures are shipped with a nominal pressure exceeding 12.4 MPa (1800 psi), which provides the user with 0.73 m^3 (25.8 ft^3) of useable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-350 brass valve, which is the recommended outlet for this propane mixture. NIST recommends that this cylinder not be used below 0.7 MPa (100 psi).

Other Designations: Propane (*n*-propane; dimethyl methane; propyl hydride; propylhydride; liquefied petroleum gas; LPG) in **Nitrogen** (dinitrogen) **Gas Cylinder**

Chemical Name	Chemical Formula	CAS Registry Number
Propane	C_3H_8	74-98-6
Nitrogen	N_2	7727-37-9

DOT Classification: Non-flammable Gas, UN1956

Manufacturer/Supplier: Available from a number of suppliers

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration	Exposure Limits and Toxicity Data
Propane	5000 μmol/mol	ACGIH TWA: 25 000 mg/kg
		OSHA TWA: 1 000 mg/kg
Nitrogen	balance	simple asphyxiant
		Rat, Inhalation: LC_{50}: 1 068 mg/m^3/4 h
		Mouse, Inhalation: LC_{LO}: 320 mg/kg

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Propane	Nitrogen
Appearance and Odor: colorless gas with a distinct odor	**Appearance and Odor:** colorless and odorless
Relative Molecular Mass: 44.11	**Relative Molecular Mass:** 28.0134
Density (@ -45 °C): 0.5853	**Density:** 1.2506 g/L
Vapor Density (air = 1): 1.55	**Vapor Density (air = 1):** 0.967
Vapor Pressure (@ 20°C): 6536 mm Hg	**Vapor Pressure (-196 °C):** 760 mm Hg
Freezing Point (@ 4000 mm Hg): -190 °C	**Freezing Point:** -210 °C
Boiling Point: -42 °C	**Boiling Point:** -196 °C
Viscosity: not applicable	**Viscosity (@ 27 °C):** 0.01787 cP
Water Solubility: slightly soluble	**Water Solubility**: 1.6 %
Solvent Solubility: soluble in absolute alcohol, ether, chloroform, benzene, turpentine	**Solvent Solubility:** soluble in liquid ammonia; slightly soluble in alcohol

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for this propane/nitrogen mixture **DO NOT** exist. The actual behavior of the mixture may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Propane
Flash Point: 105 °C **Method Used:** Not available **Autoignition Temperature:** 450 °C

Flammability Limits in Air (Volume %): **UPPER:** 9.5
LOWER: 2.1

Unusual Fire and Explosion Hazards: Cylinders may rupture under fire conditions. Nitrogen reacts with lithium, magnesium, neodymium at high temperatures. Mixtures of ozone and nitrogen may be explosive. Titanium is the only element that will burn in nitrogen.

Propane is a severe fire hazard when exposed to heat and/or flame. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Containers may rupture or explode if exposed to heat. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire.

Special Fire Procedures: Fire fighters should wear full protective clothing and self-contained breathing apparatus (SCBA) when this material is involved in a fire. Keep fire cylinders cool with water spray. If possible, stop the product flow.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** ____ **Unstable**

Conditions to Avoid: Protect cylinders from physical damage and sources of heat. **DO NOT** store cylinders in poorly ventilated areas.

Incompatibility (Materials to Avoid): Nitrogen is incompatible with metals and oxidizing materials. Carbon dioxide is incompatible with combustible materials, oxidizing materials, metal salts, reducing agents, metal carbides, metals and bases.

Propane is incompatible with combustible and oxidizing materials.

See Section IV: *Fire and Explosion Hazard Data*

Hazardous Decomposition or Byproducts: Thermal decomposition of nitrogen will produce oxides of nitrogen. Thermal decomposition of propane will produce oxides of carbon.

Hazardous Polymerization: ____ **Will Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** ____ **Ingestion**

Nitrogen: This material is a high pressure gas that can cause rapid suffocation. This gas may also cause eye, skin, and respiratory tract burns. The mixture can act as a simple asphyxiant by displacing air necessary for life. Nitrogen inhaled under increased atmospheric pressure, (>1.5 atmospheres), may dissolve in the fat-containing brain cells, and act as an anesthetic, causing necrosis. Persons who have been exposed to nitrogen under increased pressure and then suddenly released from the pressure may develop decompression sickness. Decompression is sickness caused by the formation of nitrogen bubbles in the blood following a rapid drop in pressure and is characterized by severe pains in the joints and chest, skin irritation, cramps, and paralysis.

Propane: Brief exposure to 10,000 mg/kg of propane caused no symptoms. Higher concentrations produced slight dizziness, but were not noticeably irritating to the nose or respiratory tract. Concentrations exceeding 100,000 mg/kg may produce disorientation, excitation, excessive salivation, headache and vomiting. Skin exposure to the gas has no adverse effects; however, due to the rapid evaporation, in liquid form, frostbite with redness and pain can occur.

Medical Conditions Generally Aggravated by Exposure: Nitrogen aggravates respiratory disorders.

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with copious amounts of water for at least 15 minutes while removing contaminated clothing. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Inhalation: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. Lay victim with head and chest lower than hips to improve drainage of fluids from the lungs. Obtain medical assistance.

Ingestion: Not applicable

TARGET ORGAN(S) OF ATTACK: Propane: central nervous system

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat. In case of leakage, use self-contained breathing apparatus.

Waste Disposal: Dispose of gas into an adequate amount of alkaline potassium permanganate solution. Dispose of non-refillable cylinders in accordance with federal, state, and local regulations. **DO NOT** return the empty cylinder to the supplier.

Handling and Storage: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Wear safety shoes when handling cylinders. Use adequate general and local exhaust ventilation to maintain concentrations below exposure limits and to avoid asphyxiation. A chemical safety shower and an eyewash station must be readily available. For protection of eyes, wear safety glasses.

> **NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store in well ventilated areas away from combustibles. Keep valve protection cap on cylinders when not in use.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Source: MDL Information Systems, Inc., MSDS *Nitrogen,* 16 September 2002.
MDL Information Systems, Inc., MSDS *Propane,* 16 September 2002.